

CLAIMS:

1. A catheter comprising, a shaft, the shaft having a proximal portion, a distal portion, the distal portion terminating at a distal end, and a conduit there through, a distal tip layer, the distal tip layer being in the form of a tube and being positioned about the distal portion of the shaft, the distal tip layer having a proximal end and a distal end, wherein the distal end of the distal tip layer extends distally to at least the distal end of the shaft, the catheter further comprising a medical balloon, the balloon having a body portion position between a proximal waist and a distal waist, wherein the distal waist is connected to the distal portion of the shaft and is positioned at least adjacent to the proximal end of the distal tip layer.
2. The catheter of claim 1, wherein the distal end of the distal tip layer distally extends beyond the distal end of the shaft.
3. The catheter of claim 1, the distal end of the shaft having a first longitudinal portion having a first diameter and a second longitudinal portion having a second diameter, the second longitudinal portion being immediately adjacent to the first longitudinal portion, wherein the first diameter is greater than the second diameter, the second longitudinal portion forming a circumferentially stepped down portion from the first longitudinal portion, wherein the distal tip layer is positioned around the circumferentially stepped down portion.
4. The catheter of claim 3, wherein the shaft comprises a first layer and a second layer, the second layer being about the first layer, wherein the first layer and the second layer are made out of different materials.
5. The catheter of claim 4, wherein the second layer comprises Pebax and the first layer comprises polyethylene.
6. The catheter of claim 4, wherein the first layer is cut.
7. The catheter of claim 6, wherein the cut is a spiral cut.
8. The catheter of claim 7, wherein a spiral space is formed by the spiral cut.
9. The catheter of claim 4, the first layer having a plurality of circumferential cuts.
10. The catheter of claim 2, wherein the distal end of the distal tip layer distally extends no more than 1 mm beyond the distal end of the shaft.
11. The catheter of claim 2, wherein the distal end of the distal waist abuts the proximal end of the distal tip layer.

12. The catheter of claim 2, wherein there is a gap between the distal waist and the distal tip layer.
13. The catheter of claim 1, wherein the distal tip layer is between the distal waist and the shaft.
- 5 14. The catheter of claim 3, wherein the proximal end of the distal tip layer abuts the distal waist.
15. The catheter of claim 3, wherein the distal tip layer is between the distal waist and the shaft.
16. The catheter of claim 13, wherein the distal end of the distal tip layer distally
10 extends beyond the distal end of the shaft.
17. The catheter of claim 16, wherein the distal tip layer extends no more than 7mm beyond the shaft.
18. The catheter of claim 15, wherein the distal tip layer is circumferentially stepped to receive the distal waist.
- 15 19. The catheter of claim 13, wherein the distal tip layer is a tie layer and wherein the distal waist, the shaft and the tie layer are thermally bonded together.
20. The catheter of claim 15, wherein the distal tip layer is a tie layer and wherein the distal waist, the shaft and the tie layer are thermally bonded together.
21. The catheter of claim 19, wherein the distal waist and the shaft are incompatible
20 for thermal bonding.
22. The catheter of claim 19, wherein the distal waist and the shaft are incompatible for thermal bonding.
23. A catheter comprising, a shaft, a first tubular layer about the shaft and a second tubular layer about the shaft, the shaft and the first and second tubular layers being
25 thermal bonded together, the first tubular layer having an inner side and an outer side and being at least partially between the second tubular layer and the shaft, wherein the second tubular layer and the shaft are incompatible for thermal bonding with one another.
24. The catheter of claim 23, the shaft having a proximal portion, a distal portion,
30 the distal portion terminating at a distal end, and a conduit there through, the first tubular layer being positioned about the distal portion of the shaft, the second tubular layer being a medical balloon, the balloon having a body portion positioned between a

proximal waist and a distal waist, wherein the distal waist is thermally bonded to the first tubular layer and the first tubular layer is thermally bonded to the shaft.

25. The catheter of claim 24, wherein the outer side of the first tubular layer is compatible for thermal bonding to the distal waist and the inner side of the first tubular
5 layer is compatible for thermal bonding to the shaft.
26. The catheter of claim 23, wherein the first tubular layer comprises a layer of EMS and a layer of Hytrel or Arnitel.
27. The catheter of claim 24, wherein the first tubular layer comprises a layer of EMS and a layer of Hytrel or Arnitel.
- 10 28. The catheter of claim 24, wherein the shaft extends distally beyond the distal waist and the first tubular layer.